

APPENDIX A

1. A polycrystalline silicon film, the polycrystalline film containing Ni atoms of which density ranges  $2 \times 10^{17}$  to  $5 \times 10^{19}$  atoms/cm<sup>3</sup> on average, and an electrical conductivity activation energy between 0.52eV and 0.71eV, the polycrystalline silicon film comprising a plurality of needle-shaped silicon crystallites.
2. The polycrystalline silicon film according to claim 1, wherein the polycrystalline silicon film is formed by crystallizing an amorphous silicon film containing Ni atoms properly by means of carrying out thermal treatment and applying electric field.
3. A polycrystalline silicon film, the polycrystalline film containing Ni atoms of which density ranges  $2 \times 10^{17}$  to  $5 \times 10^{19}$  atoms/cm<sup>3</sup>, and an electrical conductivity activation energy between 0.52eV and 0.71eV, the polycrystalline silicon film comprising a plurality of needle-shaped silicon crystallites, the polycrystalline silicon film on an insulating substrate.
4. The polycrystalline silicon film according to claim 3, wherein a buffer layer is formed between the insulating substrate and the polycrystalline silicon film.
5. The polycrystalline silicon film according to claim 3, wherein the polycrystalline silicon film is formed by crystallizing an amorphous silicon film containing Ni atoms properly by means of carrying out thermal treatment and applying electric field.

6. A polycrystalline silicon film, the polycrystalline film containing metal of which density ranges  $2 \times 10^{17}$  to  $5 \times 10^{19}$  atoms/cm<sup>3</sup>, and an electrical conductivity activation energy between 0.52eV and 0.71eV, the polycrystalline silicon film comprising a plurality of needle-shaped silicon crystallites wherein the metal is a catalyst for metal induced crystallization of silicon.

7. The polycrystalline silicon film according to claim 6, wherein the polycrystalline silicon film is formed by crystallizing an amorphous silicon film containing the metal by means of carrying out thermal treatment and applying electric field.

9. A polycrystalline silicon film, the polycrystalline film containing metal of which density ranges  $2 \times 10^{17}$  to  $5 \times 10^{19}$  atoms/cm<sup>3</sup>, and an electrical conductivity activation energy between 0.52eV and 0.71eV, the polycrystalline silicon film comprising a plurality of needle-shaped silicon crystallites wherein the metal is a catalyst for metal induced crystallization of amorphous silicon.